REMARKS/ARGUMENTS

Election/Restriction Requirement

The claims were subject to an election/restriction requirement, and thus, only claims 1 through 45 are under consideration in this application. Claims 46 through 50 stand withdrawn.

Amendment of the Specification

The present application has been amended to correct minor typographical errors and to insert serial numbers that were not available at the time of filing. No new matter has been added.

Amendments to the Claims

Claim 13 has been amended herein to correct a minor typographical error. No new matter has been added.

Double Patenting

Claims 1, 5-13, 18-38, 44, and 45 were provisionally rejected under the judicially created doctrine of obviousness-type double patenting over claims 6-18, 42, and 52 of co-pending Application No. 10/720,558. Claims 1, 10-13, and 18-25 were provisionally rejected under the judicially created doctrine of obviousness-type double patenting over claims 1-5 and 8 of co-pending Application No. 10/720,617. Attached is a responsive Terminal Disclaimer which would overcome an actual rejection should patents issue on the co-pending applications. Withdrawal of the double patenting rejection is respectfully requested.

35 U.S.C. 103 Rejection of Claims 1-44 Over Uzio et al. '280

The claims were rejected over Uzio et al. U.S. Patent 6, 498,280 ("Uzio") as obvious for Uzio's teaching of supported catalyst with a Group 8, 9, or 10 element; a Group 13 element; a Group 14 element; along with an alkali or alkaline earth metal; and optionally halogen. The rejection notes that the reference's lists of metals on the support include rhodium and another element as claimed within the ranges claimed and prepared by any known technique. Applicants respectfully traverse the rejection.

Uzio

Uzio is a typical platinum catalyst disclosure, which happens to include hundreds of other possible combinations of elements in a variety of ranges, some of which overlap with the current claims. This can hardly be considered a teaching or even a suggestion of the invention. Furthermore, it contains no indication that certain elements in certain ranges should be prepared in a manner so as to leave a shell of not more than 1000 microns. Finally, there is no suggestion to choose certain elements in certain ranges so as to achieve beneficial catalysts for reduction of green oil in the selective removal of alkynes and diolefins.

Uzio teaches a dehydrogenation catalyst that limits side reactions while conserving platinum. While obtaining at least 50% accessibility of the platinum is taught, this is intended to mean that sufficient metal is available within the structure of the catalyst, regardless of location; i.e., surface, mid-way, or center, etc. While any technique known for depositing is mentioned, there is no teaching to provide a surface area and there are no limitations set around the amount of each metal and the location thereof on the catalyst particles. Once again, while a list of group 8, 9, and 10 elements are mentioned, platinum is clearly preferred and only platinum is exemplified. Only chloroplatinic acid is mentioned as a source of the element. Note that the accessibility, not the location of the platinum is given in the examples. The skilled artisan is left wondering, from the Uzio disclosure, which elements to pick, what ranges of components to provide, and how the catalyst should be structured, if at all. Certainly, the skilled artisan would not look to choose components and structure for a suitable hydrogenation catalyst from this dehydrogenation teaching.

Withdrawal of the 35 USC 103 rejection of the claims with respect to Uzio is respectfully requested.

35 U.S.C. 103 Rejection of Claims 1-45 Over Shepherd et al. '866

The claims were rejected under 35 USC 103 over Shepherd et al. U.S. Patent 6,503,866 ("Shepherd") as obvious for Shepherd's disclosure of a supported platinum group catalyst with other optional elements wherein the platinum group metal may be dispersed in the surface layer of the catalyst. Applicants respectfully traverse the rejection.

Shepherd

Shepherd discloses a shaped dehydrogenation catalyst of a certain X-ray diffraction pattern and having a high total surface area with good piece crushing strength. Alumina is taught as the support; platinum group elements, halogen components, and additional elements are disclosed as optional. There is no direct selection of the invention components, ranges, and the support's surface layer depth. Shepherd provides no teaching regarding selection of the depth of the surface layer other than to indicate the concentration tapers off in progressing from the surface to the center. Platinum is clearly the choice for optional metal if used at all. There is no indication to use rhodium instead of platinum or to combine any particular further optional material with the rhodium.

The skilled artisan with only Shepherd (and not the present disclosure) before him is asked to perform hundreds of permutations and combinations to arrive at the correct materials for his purpose, then choose appropriate ranges of materials such as given in the dependent claims, and finally decide on surface penetration depth without any guidance. All of this experimentation cannot be expected from a hydrogenation catalyst chemist looking at dehydrogenation catalyst disclosures.

The Invention

The presently claimed invention is a catalyst and its preparation wherein: rhodium and a Group 1-15 metal are predominantly contained in an outer surface layer of the support to a depth of not more than 1000 microns (claim 1). The catalysts of the invention are shown to provide not only (i) significant reduction in oligomers ("green oil") production in a hydrogenation of small amounts of diolefins and alkynes from an olefin stream but also (ii) a lower selection of ethane than prior art catalysts. Nothing in the cited art teaches the combinations, ranges, and surface layer characteristic now claimed. Improved results of the inventive catalyst in an olefins stream containing alkynes is clearly set forth in Tables I and III of the specification Examples.

Shepherd suffers in comparison by being really just a support shape and crystal structure teaching which offers platinum and other metals as options. The laundry list of optional metals and components is so significant as to be far beyond the typical skilled artisan's ability to

experiment with various permutations and combinations.

In the Shepherd teaching, no metals are required according to the dehydrogenation catalyst disclosure. When platinum is optionally selected (really the only metal clearly taught for this reference), it *may* be present as a surface layer but no depth of penetration is provided. The skilled artisan must go even farther afield to arrive at the invention of some of the dependent claims by further limiting the surface depth penetration, choosing a Group 12-15 metal for similar penetration, and picking ranges of components that are wider than those given in Shepherd.

Finally, it is respectfully submitted that it would not be logical for the skilled artisan looking for reduction of green oil in a hydrogenation process to select various catalyst materials, decide on surface penetration for some of them, and pick ranges outside those of a dehydrogenation catalyst teaching, even if there is some overlap. Even a dehydrogenation catalyst chemist would be faced with a staggering task. As such, we respectfully submit that the Examiner has not set forth a *prima facie* case of obviousness.

For these reasons, we respectfully submit that the presently claimed invention is not obvious with respect to Shepherd, and we request withdrawal of the rejection.

CONCLUSION

Reconsideration in view of the submitted Terminal Disclaimer and the above remarks, and allowance of the application are respectfully requested.

It is believed that an action on the merits is in order and is earnestly solicited. If it would be of assistance to resolve any outstanding issues in the present application, the Examiner is invited to contact the undersigned.

Respectfully submitted,

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